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Petro- and paleomagnetic characteristics of the structural-material complexes of the diamond mining of the nyurbinskaya pipe (Middle Markha district, West Yakutia)

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Abstract

Modeling of physical and geological properties of a study object is an integral part of geological surveys at each stage. Without a model of physical and geological properties (PhGM) it is impossible to obtain a complete set of reflection indicators of an object in physical fields. The models are useful in solving a wide range of tasks on substantiation of survey methods and routines for interpreting the field data. Generally, a mineral deposit FGM contains the main elements represented by structural-material complexes (SMC) characterized by specific values of geometrical and physical parameters. We attempted at developing an PhGM of the diamond deposits controlled by the Middle Paleozoic trappe magmatism zone of the Vilyui paleoaulacogen. With this goal, in the period from 2002 to 2016, we carried out petrographic, paleomagnetic and geochemical studies of the SMC of the Nyurbinskaya pipe of Nakyn kimberlite field located in the Middle Markha district, West Yakutia. We studied terrigenous-carbonate rocks of the Late Cambrian of the Morkokinskaya and Oldondinskaya suites (ϵ 3 mrk and ϵ 3 -O 1 ol, respectively), dolerites of the Vilyui- Markha intrusive complex (βPZ 2 vm), autolithic kimberlite breccias of the Nakyn intrusive complex (i PZ 2 nk), and sandstones of the Early Jurassic Ukugut suite (J 1 UK). Important information was obtained on a wide range of petromagnetic parameters and paleomagnetism of the deposit SMC, elemental chemical composition of ferromagnetic minerals, and other data that can prove useful in discovering promising kimberlite sites in the Vilyui-Markha dike belt. The position of the paleomagnetic pole for the Late Cambrian of the Siberian Platform was clarified: latitude Φ=-35°, longitude Λ=136°, and confidence intervals dp/dm=3.5/6.9°. The poles were estimated for kimberlites (Φ=-11.5°, Λ=111.2°, dp/dm=3.5/7.5°) and pre-pipe basites (Φ=-14.6°, Λ=117.4°, dp/dm=3.7/7.1°). According to the Nyurbinskaya deposit PhGM developed on the basis of the paleomagnetic data, there was the Late Silurian - Early Devonian (S 2 -D 1) stage of kimberlite- and trappe formation. The results of our study can enhance the prospects for discovering new primary diamond deposits on the Siberian platform.

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Keywords

Dolerite, Kimberlite, Late Cambrian, Middle Markha district, Middle Paleozoic, Nakyn kimberlite field, Nyurbinskaya pipe, Paleomagnetism, Physical-geological model, Siberian platform, Vilyui

paleoaulacogen, Vilyui-Markha dike belt

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